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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of

BRALY et al.

Application No.: 10/002,676

Filed: October 31, 2001

For: METHOD FOR PLANARIZATION
ETCH WITH IN-SITU MONITORING
BY INTERFEROMETRY PRIOR TO
RECESS ETCH

)
) Examiner: Ahmed, Shamim
)
) Art Unit: 1765
)
) Docket No.: LAM2P298
)
) Date: October 25, 2006

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on October 25, 2006.

Signed: _____

Kenneth D. Wright

EXAMINER INTERVIEW SUMMARY

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Per the examiner's request, a telephone interview was conducted on October 25, 2006, between Applicants' agent Kenneth D. Wright and examiner Shamim Ahmed. The examiner indicated that the language "just before" as recited in each of independent claims 1, 11, and 18 was not sufficiently clear so as to avoid a rejection under 35 U.S.C. 112. The examiner further indicated that other than the issue regarding the language "just before," each of independent claims 1, 11, and 18 is considered allowable in view of the cited art of record. The Applicants' agent recommended that each of independent claims 1, 11, and 18 be amended as indicated below. The examiner indicated that the agent's recommended claim amendments resolve the issue regarding the language "just before."

The examiner stated that the agent's recommended claim amendments would be made in an Examiner's Amendment to enable issuance of a Notice of Allowance.

Proposed Amendments to Claims 1, 11, and 18

1. (Currently Amended) A method for processing recess etch operations in substrates, comprising:

- a) forming a hard mask over the substrate;
- b) etching a trench in the substrate using the hard mask;
- c) forming a dielectric layer over the hard mask and in the trench, the dielectric layer configured to line the trench;
- d) applying a conductive material over the dielectric layer such that a blanket of the conductive material lies over the hard mask and fills the trench;
- e1) planarization etching the conductive material to substantially planarize the conductive material;
- e2) utilizing interferometric endpoint detection to identify an endpoint of the planarization etching, the endpoint of the planarization etching occurring so as to leave a portion just before all of the conductive material ~~is removed from~~ over the dielectric layer that overlies the hard mask;
- e3) stopping the planarization etching upon identification of the endpoint of the planarization etching; and
- f) recess etching the conductive material so as to remove the conductive material over the dielectric layer that overlies the hard mask and removes at least part of the conductive material from within the trench, wherein the recess etching is performed using a different chemistry than that used to perform the planarization etching.

11. (Currently Amended) A method for processing recess etch operations in substrates, comprising:

- a) forming a hard mask over the substrate;
- b) etching a trench in the substrate using the hard mask;
- c) forming a dielectric layer over the hard mask and in the trench, the dielectric layer configured to line the trench;
- d) applying a conductive material over the dielectric layer such that a blanket of the conductive material lies over the hard mask and fills the trench;
- e1) planarization etching the conductive material using a first chemistry to substantially planarize the conductive material;
- e2) utilizing interferometric endpoint detection to identify an endpoint of the planarization etching, the endpoint of the planarization etching occurring so as to leave a portion just before all of the conductive material ~~is removed from~~ over the dielectric layer that overlies the hard mask;
- e3) stopping the planarization etching upon identification of the endpoint of the planarization etching;
- f) recess etching the conductive material using a second chemistry and one of the interferometry monitoring and a timed etch so as to remove the conductive material over the dielectric layer that overlies the hard mask and removes at least part of the conductive material from within the trench; and
- g) repeating operations (c) through (f) one or more times to form multiple layers of the conductive material in the trench.

18. (Currently Amended) A method for processing recess etch operations in substrates, comprising:

- a) forming a hard mask over the substrate;
- b) etching a trench in the substrate using the hard mask;
- c) forming a silicon dioxide layer over the hard mask and in the trench, the silicon dioxide layer configured to line the trench;
- d) applying a polysilicon material over the dielectric layer such that a blanket of the polysilicon material lies over the hard mask and fills the trench;
- e1) planarization etching the polysilicon material to substantially planarize the polysilicon material, the planarization etching of the polysilicon material using a first chemistry including Cl_2 , He, and SF_6 ;
- e2) utilizing interferometric endpoint detection to identify an endpoint of the planarization etching, the endpoint of the planarization etching occurring so as to leave a portion just before all of the polysilicon material is removed from over the silicon dioxide layer that overlies the hard mask;
- e3) stopping the planarization etching upon identification of the endpoint of the planarization etching; and
- f) recess etching the polysilicon material using one of the interferometry monitoring and a timed etch so as to remove the polysilicon material over the silicon dioxide layer that overlies the hard mask and removes at least part of the polysilicon material from within the trench, the recess etching using a second chemistry including Ar and SF_6 .

If the Examiner has any questions concerning the present Examiner Interview Summary, the Examiner is kindly requested to contact the undersigned at (408) 774-6914.

Respectfully submitted,
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